

Altair

Subject: 9th BIOLOGY

Class: Cell Structure
and Organization

Date: April 15

2011



Teacher's notes

Objectives

Vocabulary

Link and Learn

Prepared by

9th A - Cell Structure and Organization

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CACERES, Cristián	
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CHEESMAN, Renzo	
COZ, María Paula	
DÍAZ, Juan Andrés	
ECHEANDÍA, Gabriela	
FATULE, Nicole	
GONZALES, Luciana	
JORDAN, Diego	
LIMONCHI, Brunella	
MÁLAGA, Stefano	
MAZZETTI, Daniela	
MELGAR, Arianna	
MONTALDO, Yanira	
PAREDES, María Paula	
ROBLES, Pedro	
RUBIO, Juan Francisco	
SHIRONOSHITA, Sebastián	
VALDEZ, Carlos	
VALENCIA, Daniela	
VENEGAS, Gianluca	
VIACAVA, Bianca	
ZAPATA, Micaela	
ZOLESSI, Andrea	



9th B - Cell Structure and Organization

Name	Attitude
ACOSTA, José	
CABADA, Gabriela	
CAMINO, Jimena	
CARAVEDO, Gonzalo	
CORBETTO, Atilio	
COSTA, Chiara	
DONGO, Carolina	
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GARIBALDI, Chiara	
IBARCENA, María Paula	
KOGA, Jaime	
LAME, Yael	
LLOSA, Emilio	
MERINO-REYNA, Verónica	
PINTO, Romina	
PRADO, Ana Paula	
RAMOS, Jorge	
REVERDITTO, Juan Manuel	
ROLANDO, Paola	
ROSAS, Rodrigo	
SALHI, Sharif	
TORRES DE ALMEIDA, Solangie	
TRINT, Eric	
VASQUEZ, Angelo	
VILLAFUERTE, Grecia	
ZAPATA, Edgardo	
ZULOAGA, Alexis	



LIVING THINGS

Red Tides
DINOFAGELLATES



What do they all have in common?

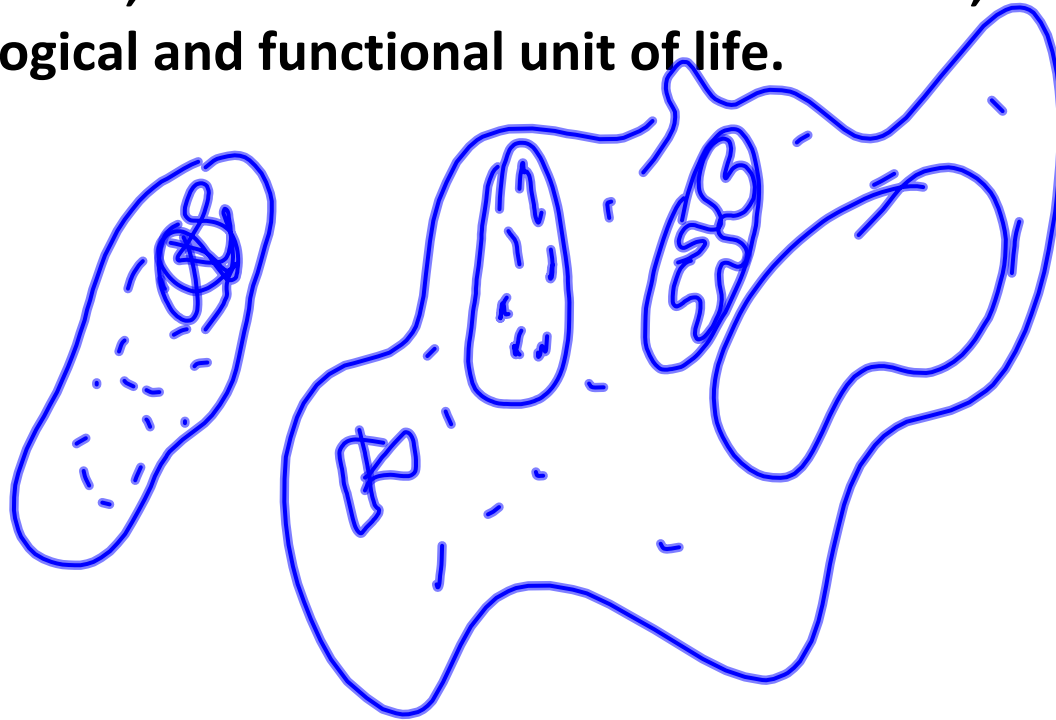
Reprod.

Movement

<http://1link.in/upcpc>

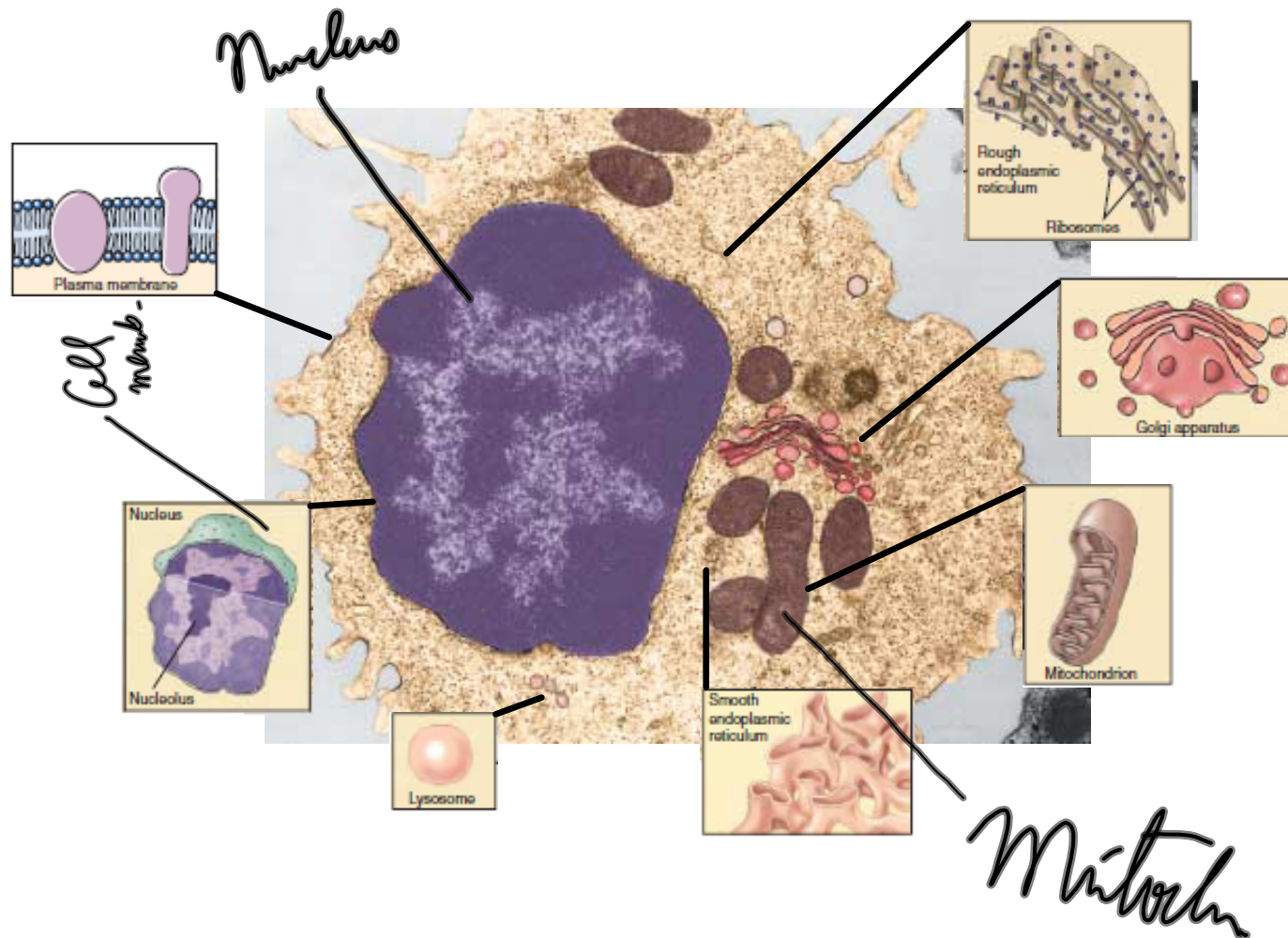
CELLS

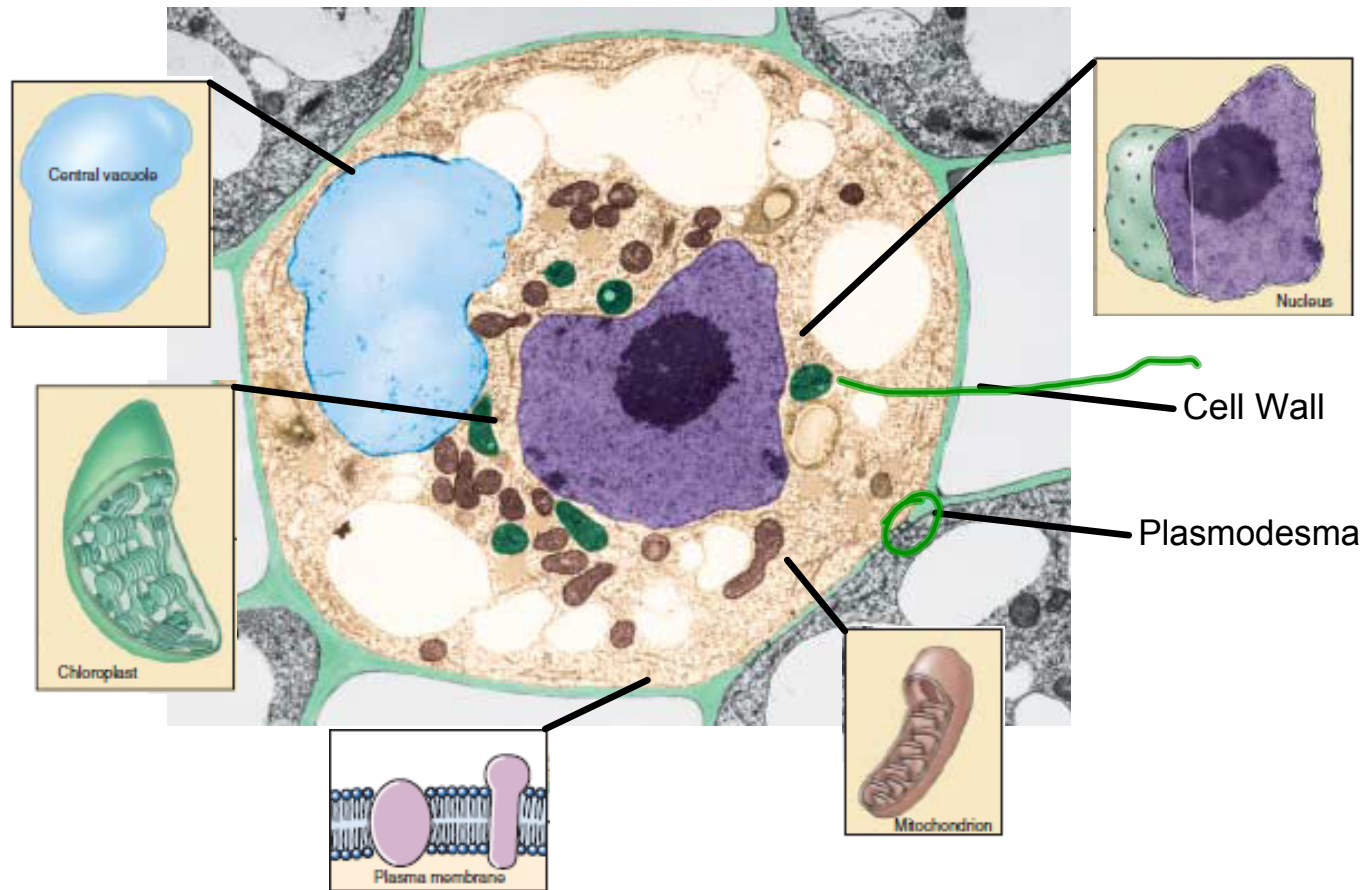
All organisms are composed of Cells, regardless of the ultrastructure, the cell is the minimum structural, morphological and functional unit of life.





Cells Alive
www.cellsalive.com





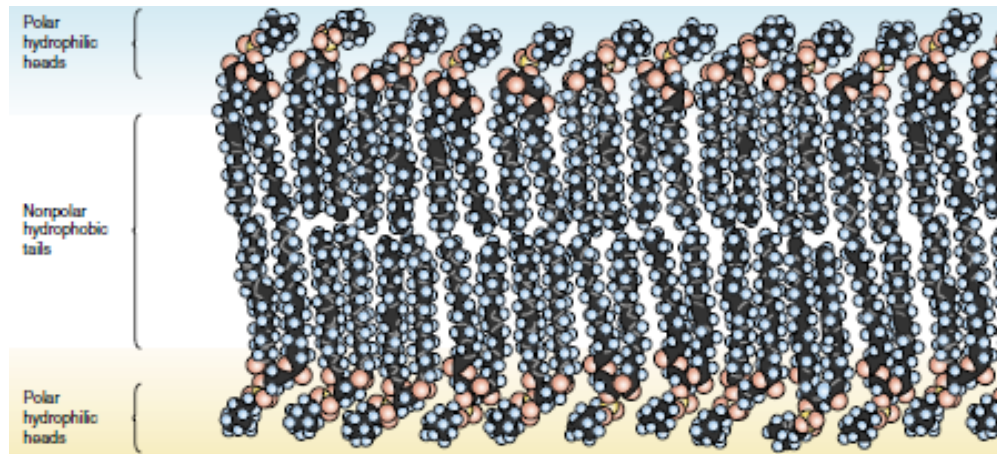
Biology - McGraw Hill - 2002

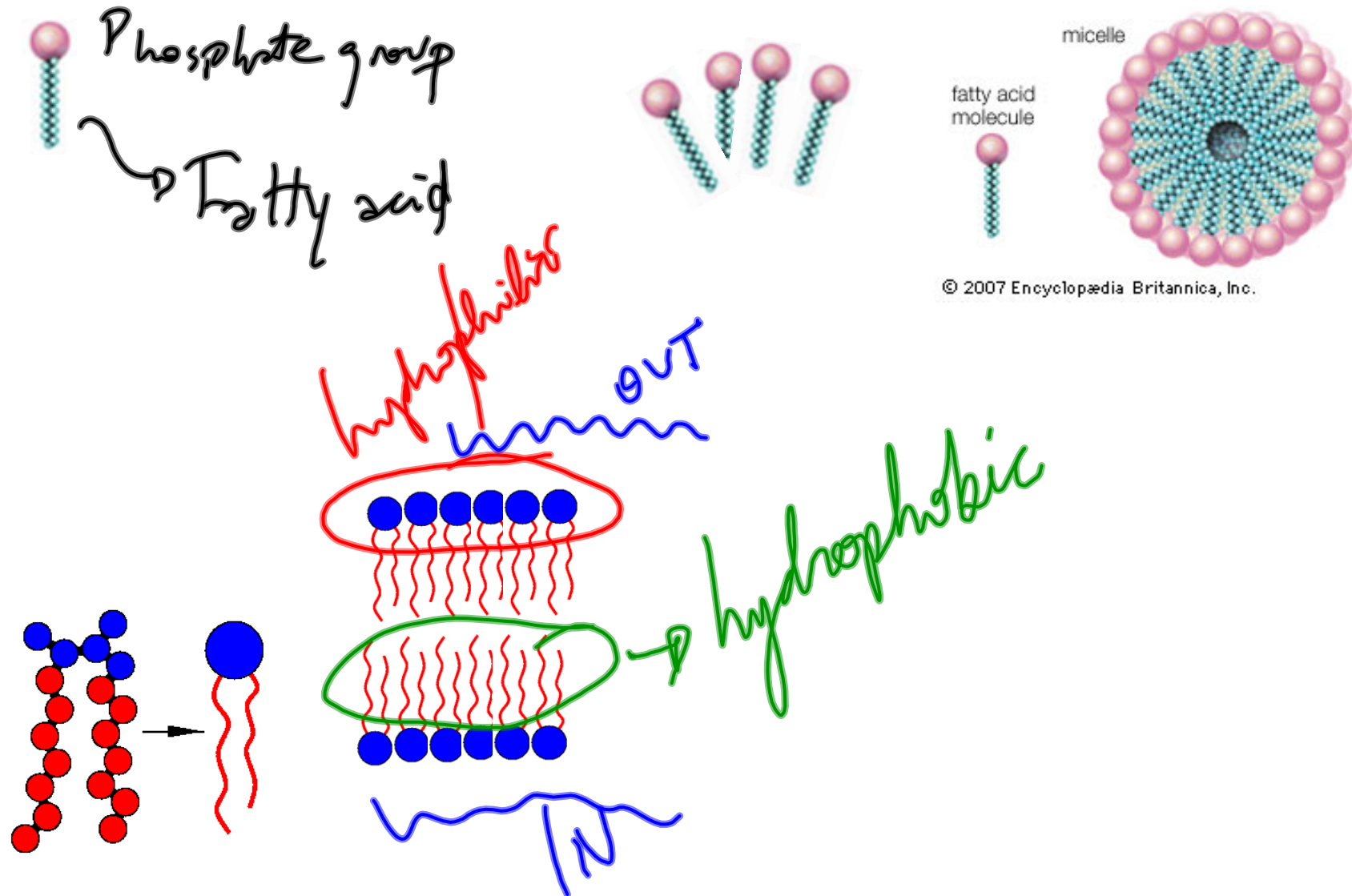
THE CELL MEMBRANE

Surrounding the Cell

- The Cell, or Plasma membrane, encloses the cell and separates its contents from its surroundings.
- It's formed by a phospholipid bilayer (5-10 *nm*) with proteins embedded in it, contributing to the cell's interaction with its environment.

Proteins
Nucleic Acids
Lipids
Carbohydrates







The Fluid Mosaic Model

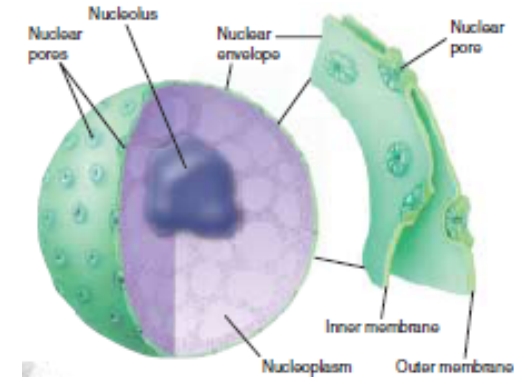
<http://goo.gl/uYfL5>



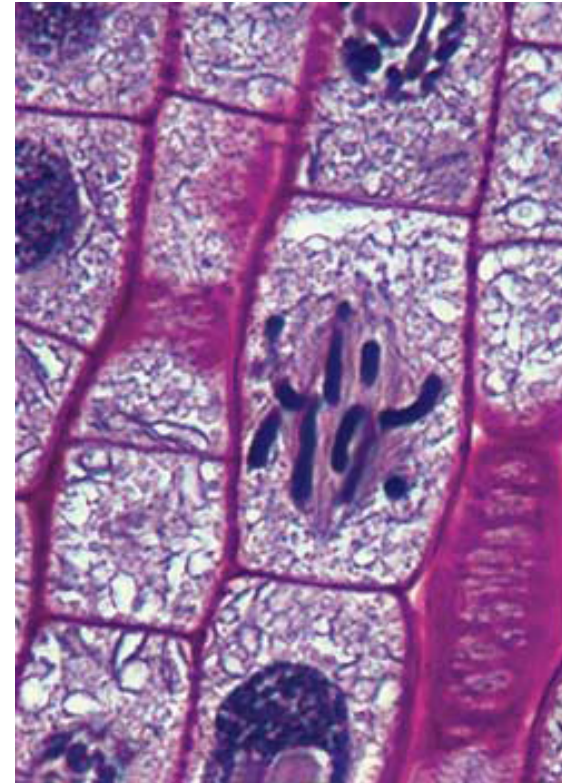
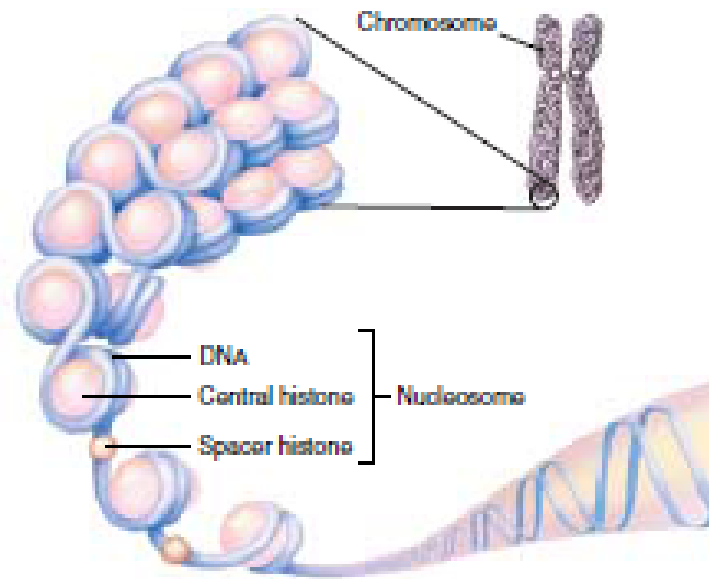
Cell Membrane: Just passing through
<http://goo.gl/UInL3>

THE NUCLEUS

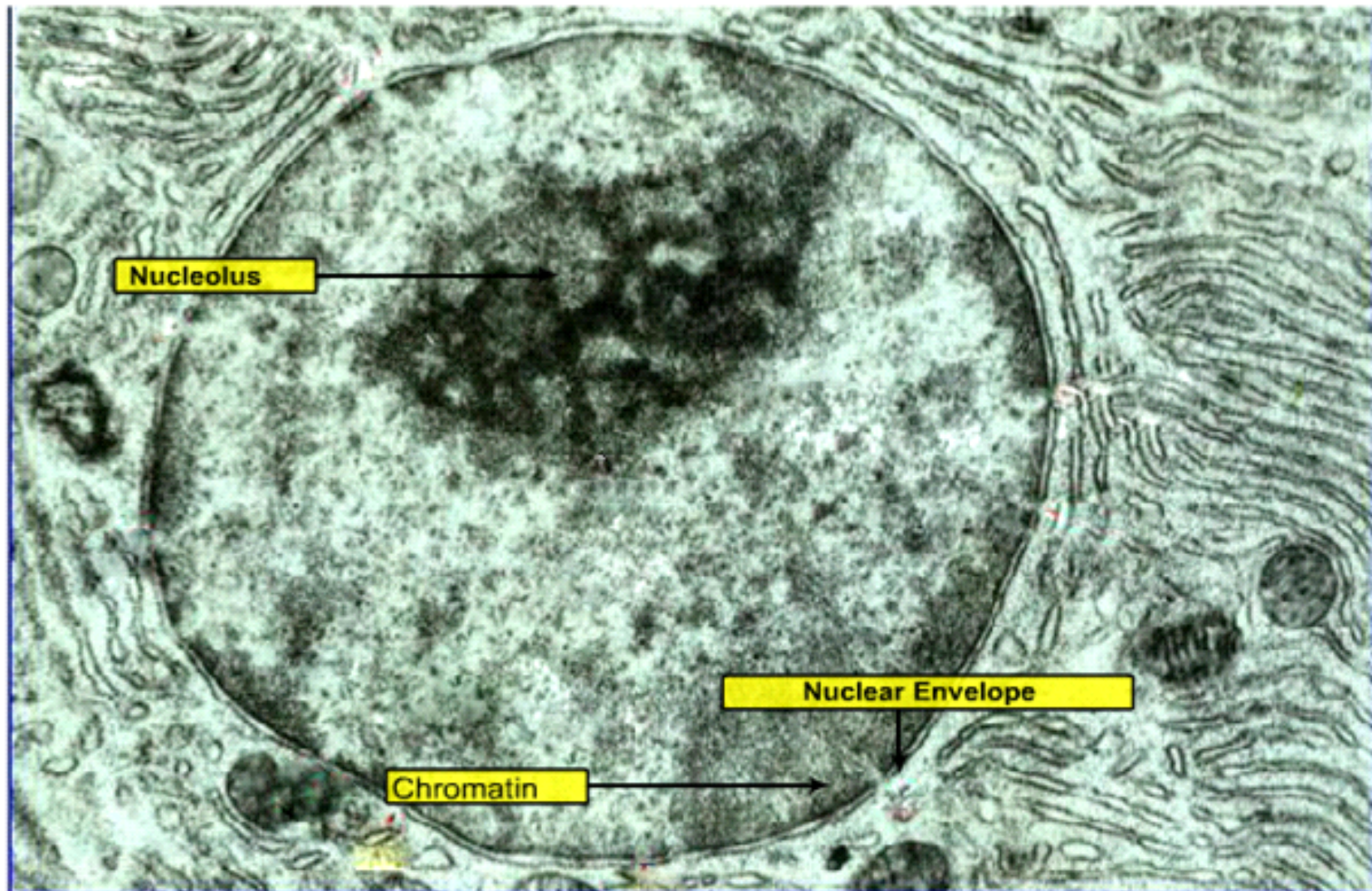
Information Center for the Cell



- Is the largest and most easily seen organelle in the eukaryotic cell.
- The *Nucleus* is the repository of the genetic information that directs all the activities of the cell.
- Most eukaryotic cells have a single nucleus, although fungi and others may have several nuclei.
- Many nuclei exhibit a dark-staining zone called *Nucleolus*, which is a region of intense RNA synthesis.



Biology - McGraw Hill - 2002





The Cell Cycle

<http://goo.gl/iEmzo>

ENDOPLASMIC RETICULUM

Compartmentalizing the Cell

- The interior of a eukaryotic cell is packed with membranes, an *endomembrane system*, dividing the cell in compartments, channeling the passage of molecules through the interior of the cell and providing surfaces for the synthesis of lipids and some proteins.
- The largest of the internal membranes is called *Endoplasmic Reticulum* (ER), with a similar composition to the plasma membrane.

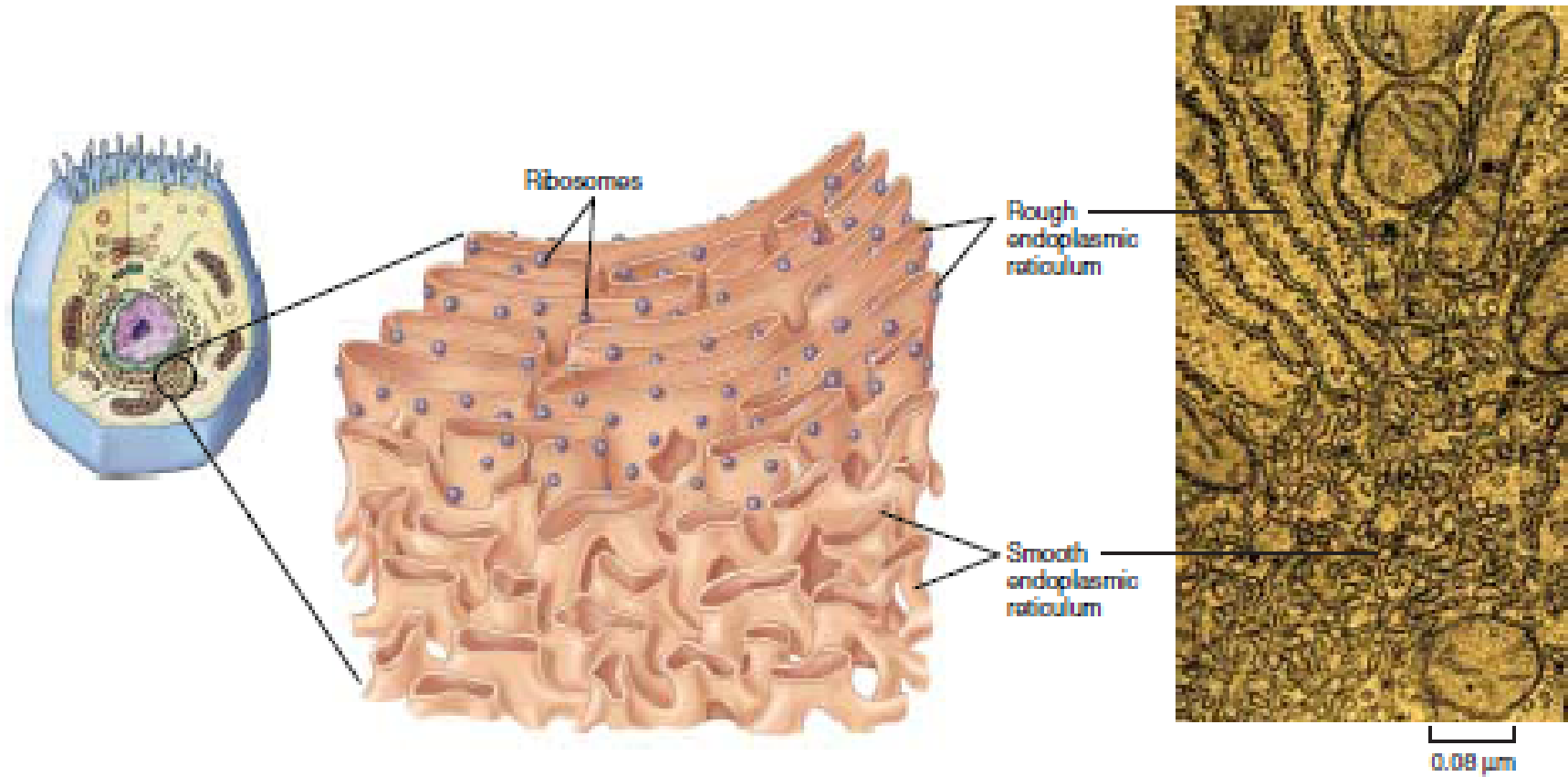
ROUGH ER (RER)

- Its surface is devoted to protein synthesis, with lots of *Ribosomes*, hence the name.
- Proteins synthesized in the surfaces of the RER are destined to be exported from the cell, with a *signal sequence* (special sequence of amino acids obtained in the Golgi Apparatus).

SMOOTH ER (SER)

- Few or no ribosomes attached, hence the name.
- The SER contains enzymes in the membrane surface to synthesize carbohydrates and lipids





Biology - McGraw Hill - 2002

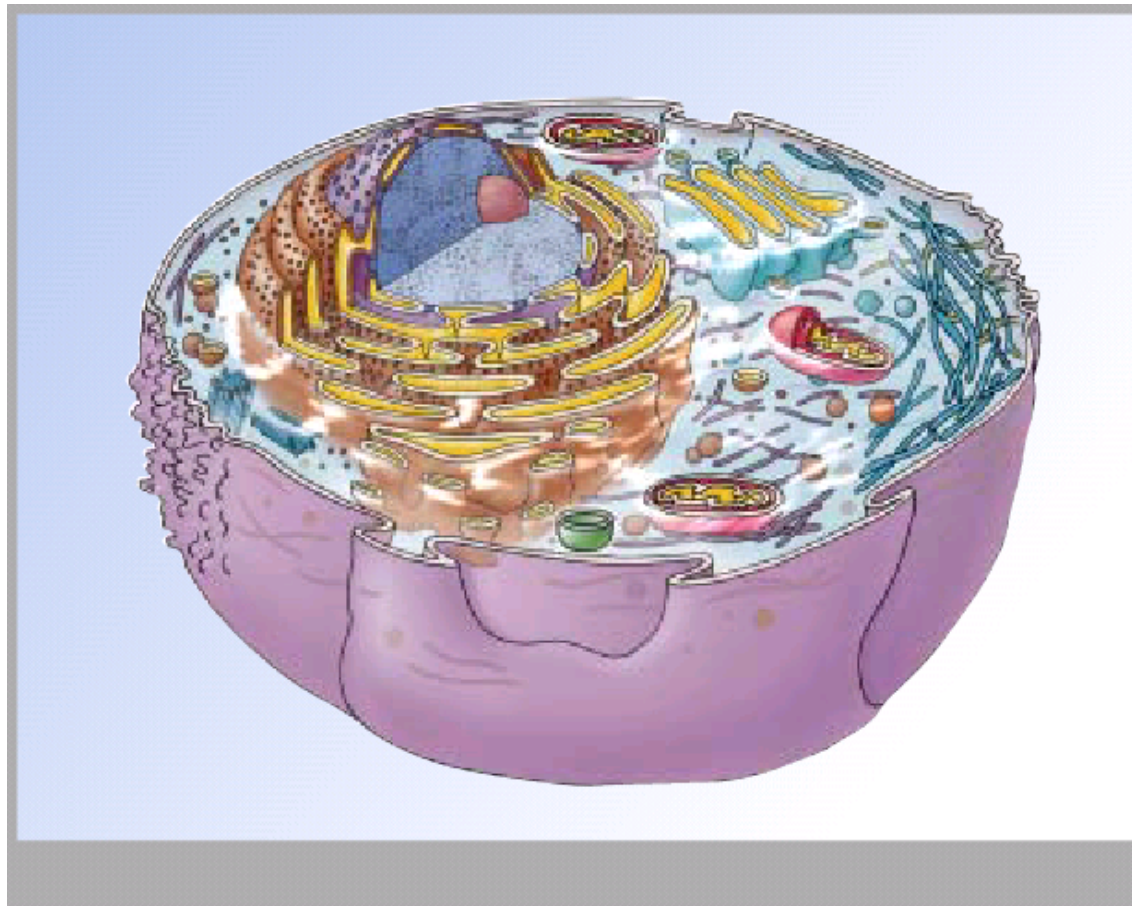
GOLGI APPARATUS

Delivery System of the Cell

- Formed by flattened stacks of interconnected membranes. Named after Camillo Golgi, an Italian physician that noticed them.
- The Golgi apparatus functions in the collection, packaging, and distribution of molecules synthesized at one place in the cell and utilized at another location in the cell.
- It has a receiving or front face (*cis*) usually located near the ER, and a back or discharging end (*trans*).
- The most common process in the Golgi Apparatus is the alteration, addition or modification of short sugar chains, producing *glycoproteins* or *glycolipids* coming from the ER.
- The modified or altered molecules are collected in the end of the Golgi bodies in folded stacks of membrane called *cisternae*.



Golgi Cisternae
<http://goo.gl/8qw0P>



STEP-THROUGH



NARRATED



HELP

<http://bit.ly/9mhurr>



Protein modification

<http://bit.ly/9mhurr>

VESICLES

Enzyme Storehouses

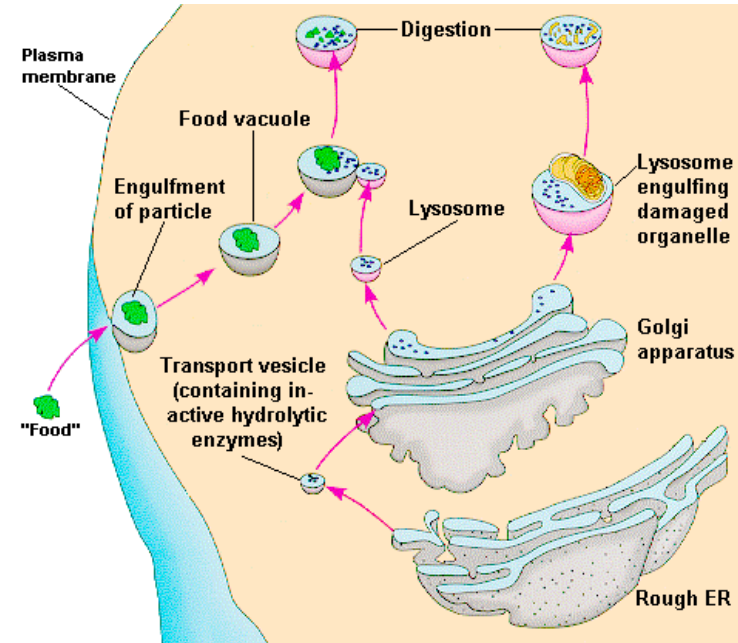
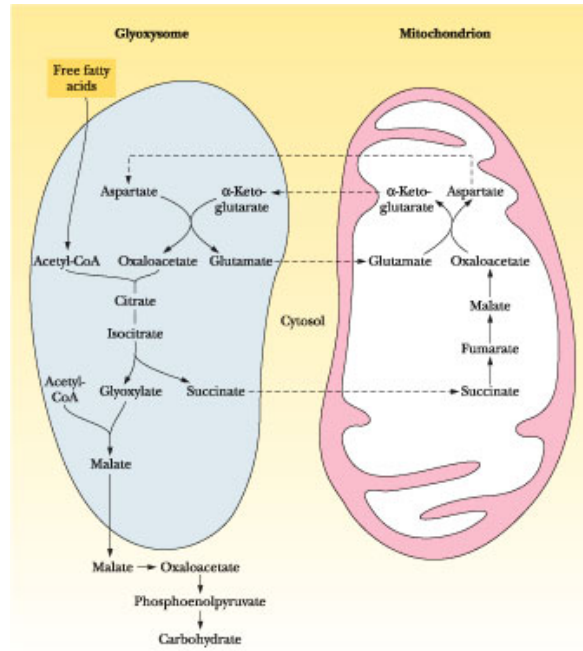
LYSOSOMES

- They are membrane-bounded digestive vesicles that arise from the Golgi Apparatus.
- They contain high levels of degrading enzymes, which catalyze the rapid breakdown of proteins, nucleic acids, lipids, and carbohydrates.

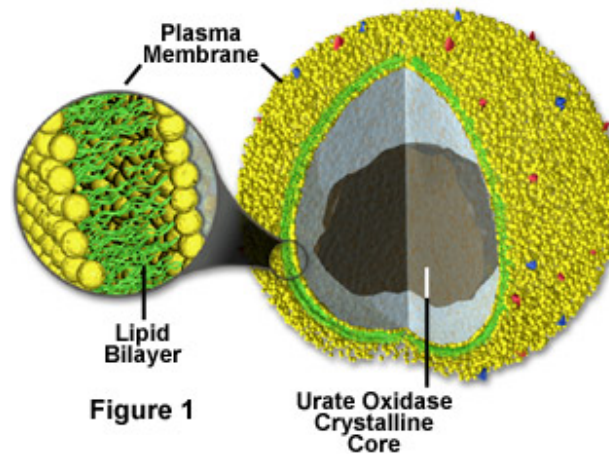
MICROBODIES

- Eukaryotic cells contain a variety of enzyme-bearing,
- membrane-enclosed vesicles called microbodies, which are found in the cells of plants, animals, fungi, and protists.
- The distribution of enzymes into microbodies is one of the principal ways in which eukaryotic cells organize their metabolism.

Examples: **Glyoxysomes** (Plants: Have enzymes that convert fats to carbohydrates), **Peroxisome** (Contains enzyme that catalyze the removal of electrons and associated hydrogen atoms).



Anatomy of the Peroxisome



<http://link.in/vmdiy>

<http://bit.ly/aNvFgK>



The Fluid Mosaic Model

<http://bit.ly/aNvFgK>

endocytosis

Endocytosis is the import of materials to the cell by infoldings of the plasma membrane.

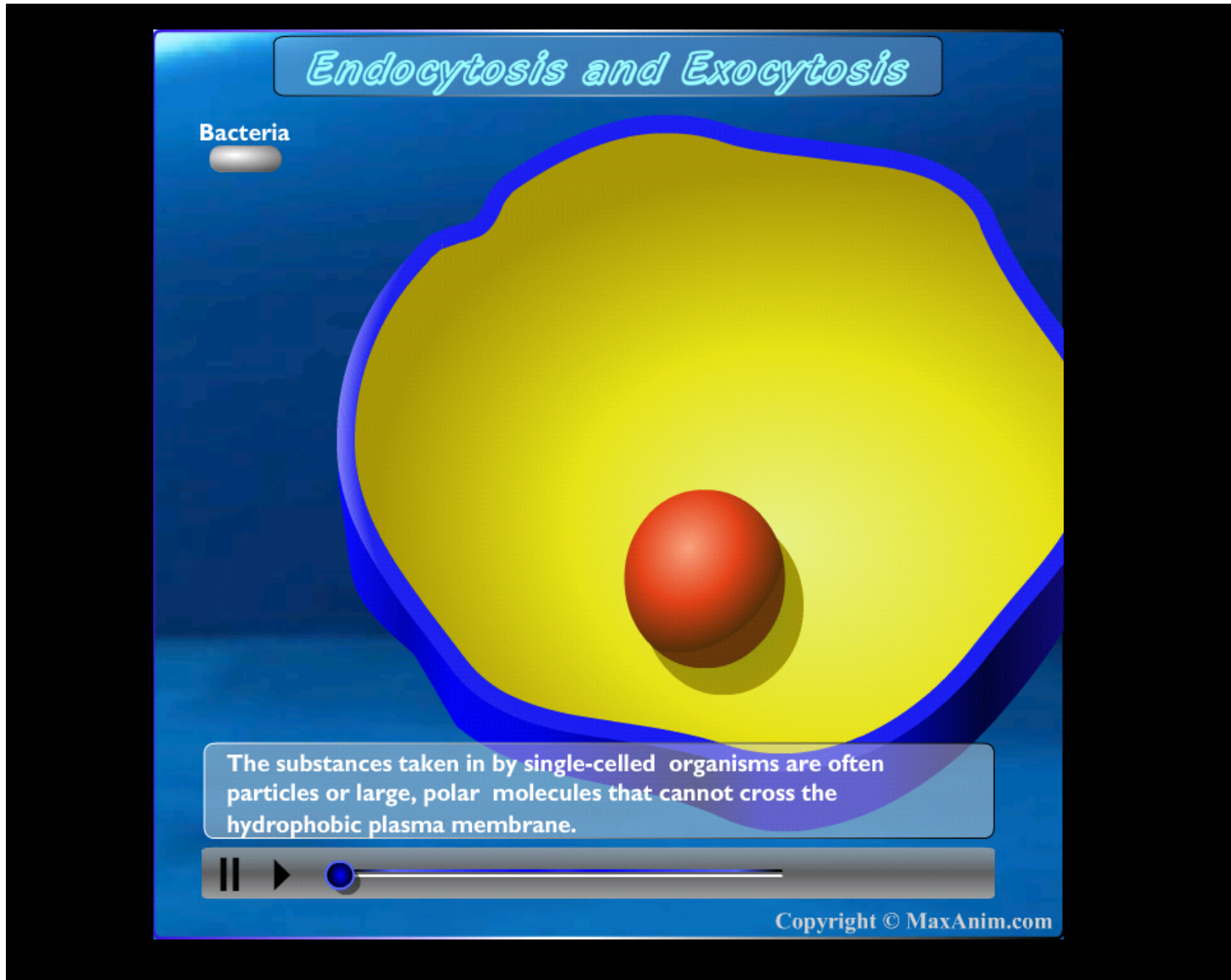


<http://bit.ly/aioHFU>



Endocytosis and Exocytosis

<http://bit.ly/aioHFU>



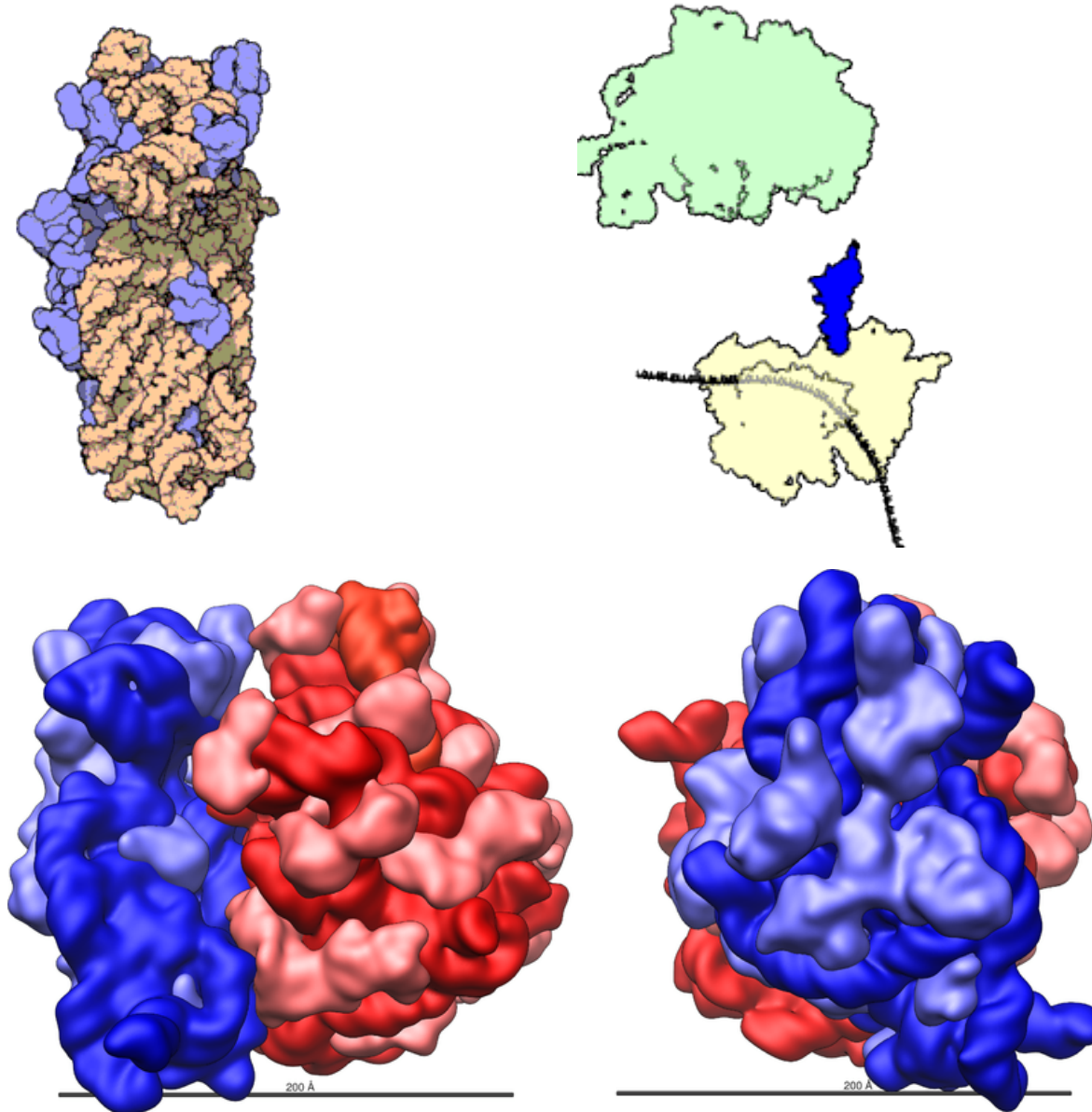


Endocytosis and Exocytosis
<http://goo.gl/PP4ix>

RIBOSOMES

Sites of Protein Synthesis

- Ribosomes are made up of several molecules of rRNA (Ribosomal RNA), bound within a complex of several dozen different proteins.
- Ribosomes are among the most complex molecular assemblies found in cells. Each ribosome is composed of two subunits.
- The subunits join to form a functional ribosome only when they attach to another kind of RNA, called messenger RNA (mRNA) in the cytoplasm.
- To make proteins, the ribosome attaches to the mRNA, which is a transcribed copy of a portion of DNA, and uses the information to direct the synthesis of a protein.



<http://bit.ly/dkaUkZ>

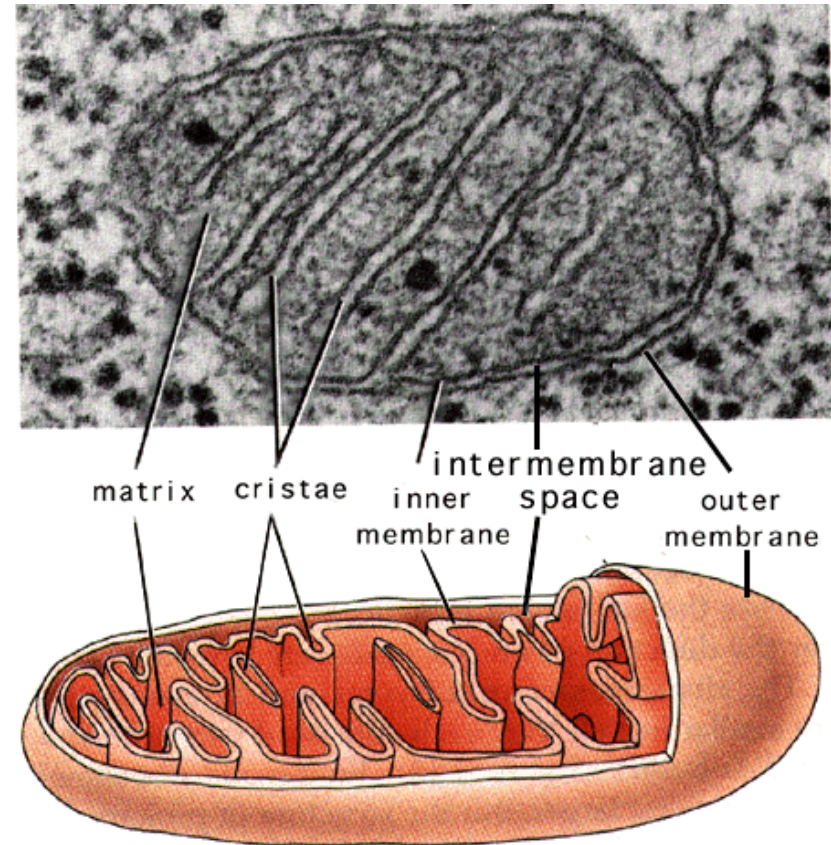
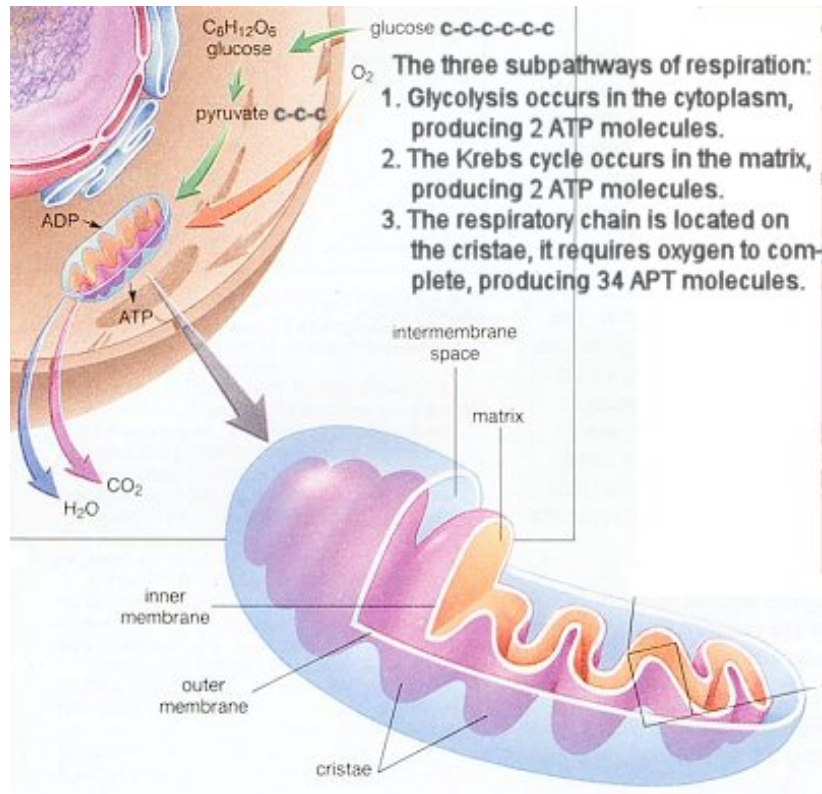
Organelles that contain DNA

Mitochondria

MITOCHONDRIA: *The Cell's Energy factory*

- Mitochondria are bounded by two membranes: a smooth outer membrane and an inner one folded into numerous contiguous layers called cristae (singular, *crista*).
- The cristae partition the mitochondrion into two compartments: a matrix, lying inside the inner membrane; and an outer compartment, or intermembrane space, lying between the two mitochondrial membranes.
- On the surface of the inner membrane, and also embedded within it, are proteins that carry out oxidative metabolism, the oxygen-requiring process by which energy in macromolecules is stored in ATP.

Biology - McGraw Hill - 2002



<http://bit.ly/ddPqsO>

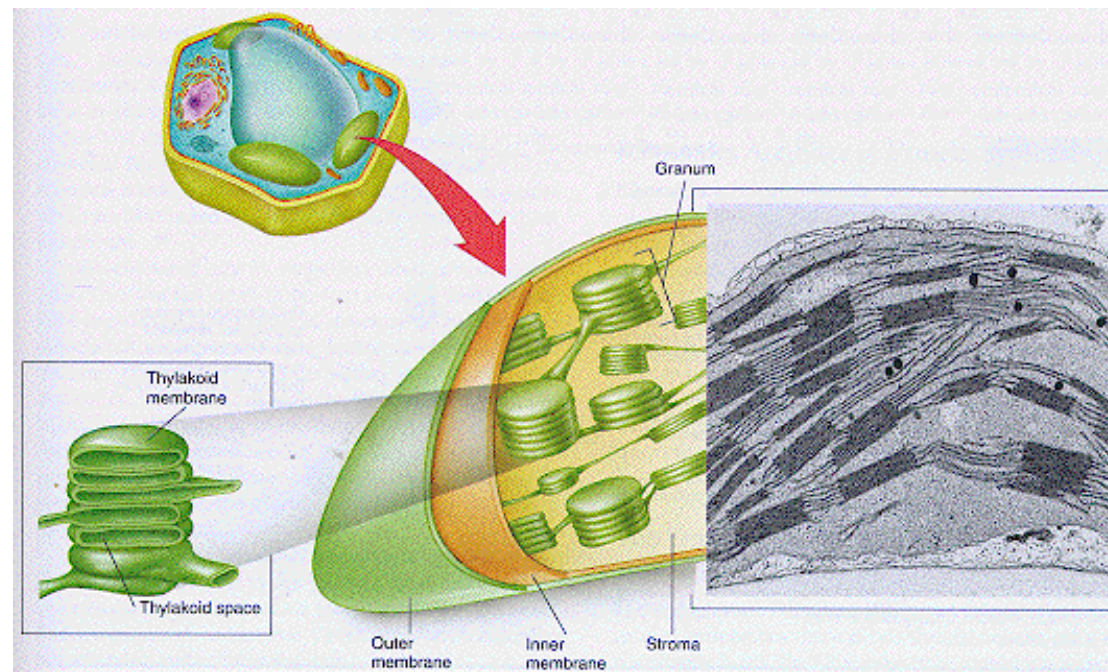
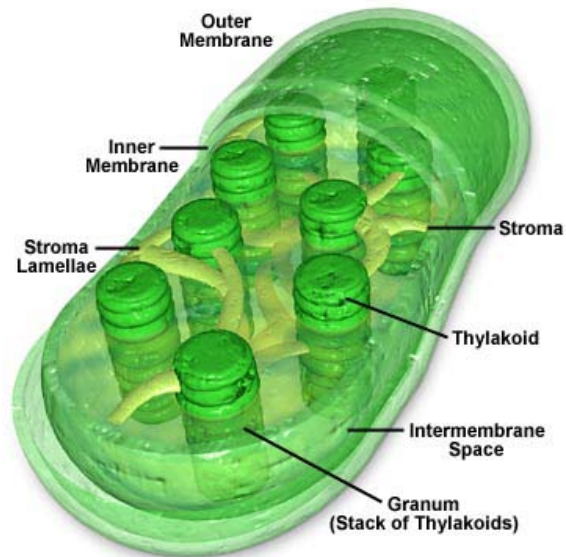
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Organelles that contain DNA

Chloroplasts

CHLOROPLASTS: *The Cell's Energy factory*

- Chloroplasts contain the photosynthetic pigment chlorophyll that gives most plants their green color.
- The chloroplast body is enclosed, like the mitochondrion, within two membranes that resemble those of mitochondria. However, chloroplasts are larger and more complex than mitochondria.
- In addition to the outer and inner membranes, which lie in close association with each other, chloroplasts have a closed compartment of stacked membranes called grana (singular, *granum*), which lie internal to the inner membrane. A chloroplast may contain a hundred or more grana, and each granum may contain from a few to several dozen disk-shaped structures called thylakoids.
- On the surface of the thylakoids are the light-capturing photosynthetic pigments, surrounding the thylakoid is a fluid matrix called the *stroma*.

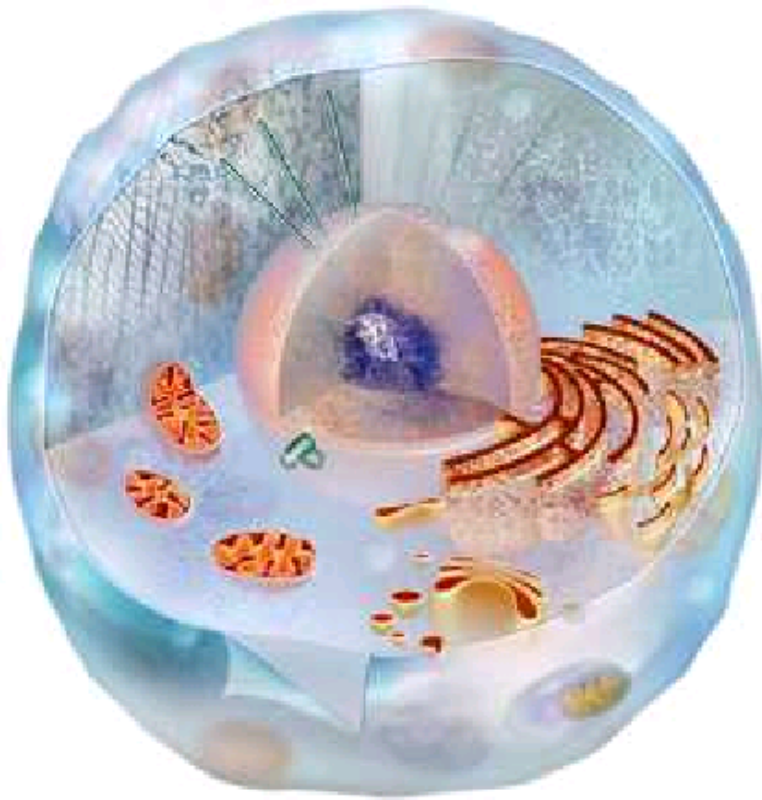


Organelles that contain DNA

Centrioles

CENTRIOLES: *Microtubule-assembly center*

- Centrioles are barrel-shaped organelles found in the cells of animals and most protists. They occur in pairs, usually located at right angles to each other near the nuclear membranes (figure 5.23); the region surrounding the pair in almost all animal cells is referred to as a centrosome.
- Although the matter is in some dispute, at least some centrioles seem to contain DNA, which apparently is involved in producing their structural proteins.
- Centrioles help to assemble microtubules, long, hollow cylinders of the protein tubulin. Microtubules influence cell shape, move the chromosomes in cell division, and provide the functional internal structure of flagella and cilia, as we will discuss later.
- Centrioles may be contained in areas called microtubule-organizing centers (MTOCs). The cells of plants and fungi lack centrioles, and cell biologists are still in the process of characterizing their MTOCs.



Pause Animation



Start Animation

The nucleus and endomembrane system. **Click Start.**



The Nucleus and Endomembrane System

<http://goo.gl/QpL7R>



Cell Organelles Activity

<http://bit.ly/a3IT4G>

<http://bit.ly/a3IT4G>

Teacher's Notes

This class has been designed to cover the topics of *Cell Structure and Organization* from Monday, April 11th till Friday, April 15th.

For further knowledge about this topic:

1. Conduct a thorough search under the topic: *Cell Structure and Organization* on the Web, books and magazines.
2. If findings are not specific, ask your teacher for suggestions.

BACK

Objectives

- Identify the two types of cells.
- Describe the structure of the components of the cell.
- Analyze the functional relation of the cell components.
- Evaluate the main processes in the cell.
- Compare and Contrast Prokaryotic and Eukaryotic cells.

***Note:** All, or most, of the objectives will be covered during class time, however the student must be responsible for those objectives not covered or concluded.*

BACK

Vocabulary

- Cell:
- Prokaryote:
- Eukaryote:
- Organelle:
- Biochemistry:

***Note:** Most of the vocabulary words will be covered during class time, however the student must be responsible for those words not covered or concluded.*

BACK

Link and Learn

You can visit the following websites to improve your understanding on the present topic:

- www.cellsalive.com/
- <http://science-altair.wikispaces.com>
- <http://learningandscience.blogspot.com>

BACK

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BACK